Major Diseases of Melons in Australia

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Background

Growers would be aware that there are many different diseases affecting melons but their causes are not always well understood. Some important diseases result in complete crop failure or cause fruit to be rejected in the wholesale market.

Accurate disease identification can be critical to choosing effective management options. The melon industry needs to remain vigilant and regular crop surveillance for diseases accompanied by accurate diagnostics is the best way to ensure that we are aware of what is happening in our crops.

This publication includes information on a number of significant melon diseases found in Australia and includes images to assist growers recognise their symptoms. Table 1 lists the significant diseases that are an issue for melon production in Australia.

Table 1. Summary of important melon diseases.

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<th>Crop</th>
<th>Disease</th>
<th>Cause</th>
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<td>Watermelon</td>
<td>Bacterial Blotch</td>
<td>Acidovorax avenae subsp. citrulli</td>
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<tr>
<td>Watermelon</td>
<td>Rind Necrosis</td>
<td>Melon necrotic spot virus</td>
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<td>Watermelon</td>
<td>Root rot</td>
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<td>Rockmelon</td>
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<td>Rockmelon</td>
<td>Internal black fruit rot</td>
<td>? Aspergillus sp.</td>
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<td>Rockmelon</td>
<td>Fusarium Wilt</td>
<td>Fusarium oxysporum</td>
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Bacterial Blotch

This disease is seed-borne and causes water-soaked irregular spots on leaves of seedlings and field plants. The fruit infections are most destructive: young fruit may abort and it causes distinctive olive-green blotches on the surface of watermelon fruit (Figure 1) which later turn brown and cause cracking with a corky appearance. The external symptoms on rockmelons are more subtle, with small watery spots on the surface (Figure 2). Internal symptoms can include brown discoloured areas and cavities in the rind.

Figure 1: Oily Bacterial Blotch symptoms on watermelon fruit

Figure 2: Subtle watery Bacterial Blotch symptoms on rockmelon fruit
**Melon necrotic spot virus**

This virus was first recorded on watermelons in the Sunraysia region in 2012 and it is also seed-borne. It can cause dark leafspots (Figure 3), streaks on petioles and runners and a dark lesion at the crown just above ground level. More importantly it affects fruit causing a brown rot of the rind (Figure 4) and breakdown or hollowing of pulp tissue. This virus is very stable and survives for long periods in the soil. Interestingly it is transmitted to plant roots by a soil fungus, *Olpidium bornovanus*, which is itself a weak plant pathogen. This fungus has a motile spore stage that “swims” to roots and then infects them along with the virus they carry. Therefore disease is more likely in lower, wetter areas of a field, or after wet weather conditions. Although MNSV also affects rockmelons there are several varieties that carry resistance to it.

![Figure 3: Leaf spots on watermelon caused by MNSV](image)

![Figure 4: Rind necrosis symptoms on watermelon caused by MNSV](image)

**Mosaic**

There are several cucurbit viruses that are known to cause mosaic symptoms – yellow or pale green patches on leaves. The most common of these viruses are *Watermelon mosaic virus*, *Zucchini yellow mosaic virus* and *Papaya ringspot virus* which are all spread by aphids. Rockmelons with mosaic symptoms (Figure 5) have been confirmed as being infected by *Beet pseudo-yellows virus* (BPsvYV) which is known to be spread by greenhouse whiteflies. Thankfully BPsvYV doesn’t affect fruit quality but infection may still reduce yields.

![Figure 5: Mosaic on rockmelon caused by BPsvYV](image)

**Cucumber Green Mottle Mosaic Virus**

CGMMV virus was first detected in Australia on watermelons in the Northern Territory in 2014. It has since been found on other cucurbits in the Northern Territory and on watermelons from one property in Queensland. All infected properties were quarantined during the outbreak, causing significant issues for affected growers. It is therefore important to ensure that CGMMV does not spread into other regions of Australia. CGMMV is very stable and remains in the soil for long periods. It is easily transmitted mechanically by handling plants or on tools or machinery. CGMMV is also a seed-borne disease. The symptoms on leaves look like other mosaic virus diseases (Figure 6). Leaves can also be stunted and die off as the plant matures. Fruit symptoms include a rind necrosis that looks similar to symptoms caused by MNSV (as in Figure 3). Plants can abort fruit and in watermelons fruit can be misshapen and show internal discoloration.
Gummy Stem Blight

This seed-borne fungal disease affects all cucurbits and symptoms appear on all plant parts. Most serious are stem infections and crown rot that can lead to vines wilting and dying. Symptoms on infected stems (Figure 7) and crowns vary from pale bleached surface tissue to brown lesions (Figure 8), but in both cases infected tissue is dotted with tiny black fungal fruiting bodies and is often accompanied by droplets of a brown gummy fluid. Symptoms on fruit include surface lesions and internal brown rot (Figure 9). Fungal spores are mostly spread by wind and water.

Sudden Wilt – Vine Decline

This disease is poorly understood in Australia and requires more study to understand the cause(s). A number of potential fungal pathogens have been found associated with rapid wilting of near-mature rockmelons and honeydews (Figure 10).

In each case, plants are weakened by the infection, and they collapse and die. Fusarium wilt is accompanied by yellowing of leaves.
In some cases the fungus *Macrophomina phaseolina* has been found associated with plants affected by Sudden Wilt (Figure 11). This fungus is known to cause the disease Charcoal Rot on a range of crop plants and is favoured by hot and dry conditions.

**Figure 11: Black fungal growth of *Macrophomina phaseolina* and bleached rockmelon stem affected by Charcoal Rot**

Other potential pathogens found associated with this disease include several *Pythium* species which are known to cause rots of the feeder roots; *Rhzoctonia solani*, which causes a rot of the root cortex (the outer layer of root tissue); *Fusarium oxysporum* f.sp. *melonis*, which causes a vascular wilt disease of rockmelons and honeydews while *F. oxysporum* f.sp. *niveum* causes a wilt of watermelons. Other species of *Fusarium* also cause crown and root rots of melons. Overseas there are other fungi associated with similar diseases of melons. One is *Monosporascus cannonballus* but this has not been found in Australia to date. Various species of the fungus *Plectosphaerella* are also known to cause vine decline disease overseas.

**Internal Black Fruit Rot**

This disease was detected during surveillance on rockmelons (Figure 12) and a fungus, *Aspergillus* sp. was isolated from the affected tissue. Further work will be required to determine if this is the cause of this disease and future surveys will assist with understanding its importance. It appears to be similar to other fruit rots such as those caused by *Fusarium oxysporum* where the fungus enters through wounds or cracking of the fruit surface tissue.

**Fusarium Wilt**

This soil-borne disease is caused by the fungus *Fusarium oxysporum* f. sp. *melonis* - Race 1. It can rapidly build up in the soil and survive for many years. It is known to infect rockmelons but so far has not been detected in Asian melons in Australia. Symptoms include the sudden wilting and death of the plant. Rot usually starts at the stem end as small spots on the skin of fruit (figure 13, 14). The affected skin is spongy and becomes covered with a white-pink mould. Fruit can be infected by the fungus entering wounds on the skin however spores can be splashed onto the fruit via rain or irrigation.

The disease expression is worse with hot weather and fungal spores can be transported in contaminated soil, on vehicles and equipment and on infected seed. A number of commercial rockmelon varieties are available with specific resistance to this pathogen.

**Figure 12: Internal Black Fruit Rot of rockmelon**

**Figure 13: Rockmelon stems affected by Fusarium**
Figure 14: Rockmelons affected by Fusarium

More information
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